What is claimed is:

1. In a vehicle having a power source for producing rotational motion, a power take-off shaft for supplying rotational motion to at least one piece of equipment other than the vehicle, and a clutch including an input shaft coupled to the power source and an output shaft coupled to the PTO shaft, wherein the clutch transmits a maximum torque between the input and output shafts in response to a maximum clutch pressure and transmits a selectable torque between the input and output shafts in response to a selected clutch engagement pressure less than the maximum clutch engagement pressure, a power take-off control system comprising:

a first transducer disposed to generate an input shaft speed signal representative of the rotational speed of the input shaft;

a second transducer disposed to generate an output shaft speed signal representative of the rotational speed of the output shaft;

a clutch control configured to effect engagement and disengagement by the clutch in response to engagement control signals applied thereto, the clutch transmitting a selectable torque between the input and output shafts dependent upon a clutch engagement pressure defined by said engagement control signals, wherein the clutch engagement pressure is variable up to the maximum engagement pressure;

a controller coupled to the clutch control, the first transducer, and the second transducer, said controller operable to monitor the input shaft speed signals and the output shaft speed signals generated by said first and second transducers and to produce time-based engagement control signals dependent thereon,

said engagement control signals each including a characteristic representative of an associated amount of clutch pressure to be applied,

said controller operable to generate a first set of time-based engagement control signals during a time period between commencement of an engagement operation and the time at which an output shaft speed signal indicative of movement by the output shaft is detected by said controller, and a second set of engagement signals at times subsequent to said detection of movement by the output shaft,

said controller operable, upon detection of movement of the output shaft, to determine whether the monitored input speed at such time has remained within an established deviation value from the nominal input speed prior to such time and to establish a first load status if the speed has remained within the established deviation value and to establish another load status if the speed has not remained within the established deviation value,

said second set of time-based engagement signals including a subset of engagement control signals dependent, in part, upon the established load status and defining a flattened control curve relative to control curves that are established for loads of said another load status.

2. The system of claim 1 further comprising a source of pressurized hydraulic fluid, the clutch being a hydraulic clutch engageable at an engagement pressure related to the hydraulic pressure applied to the clutch, the clutch control including a hydraulic valve for coupling the clutch to the source of pressurized hydraulic fluid, and the hydraulic valve being a proportional valve configured to control the

pressure of the fluid applied to the clutch from the source, wherein the pressure is dependent upon the first control signals.

3. The system of claim 2 wherein said controller includes a programmed microprocessor.

4. The system of claim 2 further comprising an over-running clutch associated with the output shaft.

5. The system of claim 3 further comprising an implement coupled to said over-running clutch.

6. The system of claim 2 wherein said controller includes a digital processor configured to produce engagement control signals the magnitudes of which are characteristics representative of associated amounts of clutch pressure to be applied at given times.

7. The system of claim 2 wherein said controller includes a digital processor configured to produce engagement control signals which are pulse-width modulated signals having a predetermined frequency, and the pressure applied to the clutch is substantially proportional to the pulse-width of the modulated signals.

8. The system of claim 7 further including filtering circuitry for coupling the first and second transducers to the digital processor.

9. The system of claim 7 wherein the first and second transducers are magnetic pickups located and proximate the input and output shafts, respectively.

10. The system of claim 1 wherein said subset of said second set of engagement control signals includes a plurality of control signals the characteristics of which are dependent upon the rate of change over time of the output shaft speed signals and the input shaft speed signal at a given time, whereby said controller determines a desired acceleration for the output shaft.

11. The system of claim 1 wherein said subset of said second set of engagement control signals includes a plurality of control signals the characteristics of which are dependent upon the rate of change over time of the output shaft speed signals and the input shaft speed signal at the time of engagement control signal generation, whereby said controller repetitively determines a desired acceleration for the output shaft over a period of time.

12. The system of claim 1 wherein said another load status includes a plurality of differentiable load types and said controller is operable to determine a particular load type dependent upon the time after commencement of an engagement operation that initial movement of the output shaft is detected.

13. The system of claim 1 wherein said first set of engagement control signals includes a plurality of shock control signals defining a series of shock control signals generated commencing at a given time during the time between commencement of an engagement operation and the time at which an output shaft speed signal indicative of movement by the output shaft is detected.

14. A method for engaging and operating variable loads on a power take-off shaft in a system having

a power source for producing rotational motion;

a power take-off shaft for supplying rotational motion to at least one piece of equipment coupled to the power take-off shaft;

a clutch including an input shaft coupled to the power source and an output shaft coupled to the PTO shaft, wherein the clutch transmits a maximum torque between the input and output shafts in response to a maximum clutch pressure and transmits a selectable torque between the input and output shafts in response to a given clutch engagement pressure less than the maximum clutch engagement pressure;

a first transducer disposed to generate an input shaft speed signal representative of the rotational speed of the input shaft;

a second transducer disposed to generate an output shaft speed signal representative of the rotational speed of the output shaft;

a clutch control configured to effect engagement and disengagement by the clutch in response to engagement control signals applied thereto, the clutch transmitting a selectable torque between the input and output shafts dependent upon a given clutch engagement pressure defined by said engagement control signals, wherein the clutch engagement pressure is variable up to the maximum engagement pressure;

a controller coupled to the clutch control, the first transducer, and the second transducer, said controller operable to monitor the input shaft speed signals and the output shaft speed signals generated by

said first and second transducers, and to produce time-based engagement control signals dependent thereon,

the engagement control signals each including a characteristic representative of an associated amount of clutch pressure to be applied; and

the controller operable to generate a first set of time-based engagement control signals during a time period between commencement of an engagement operation and the time at which an output shaft speed signal indicative of movement by the output shaft is detected by said controller, and a second set of engagement signals at times subsequent to said detection of movement by the output shaft;

the method comprising:

(a) monitoring the output shaft speed signals to detect the speeds at given times of the output shaft and initial movement of the output shaft as a result of application of engagement control signals;

(b) monitoring the input shaft speed signals to detect the speeds at given times of the input shaft;

(c) determining, upon detection of initial movement of the output shaft, the deviation of speed of the input shaft and establishing a first load status if the speed deviation has remained within an established deviation value and establishing another load status if the speed has not remained within the established deviation value;

(d) applying, for said first load status, a set of time-based engagement control signals defining a flattened control relative to control curves that would be applied for loads of said another load status.

15. The method of claim 14 wherein, at a plurality of predetermined times during said first time

period, the controller generates distinct engagement control signals that are shock control signals each having a characteristic defined by a different relationship than the characteristics of non-shock control signals generated over the first period of time, the characteristic of each such shock control signal being associated with a markedly and distinguishably higher clutch pressure and out of accordance with the particular pattern of clutch pressures associated with non-shock engagement control signals generated over the first period of time.

16. The method of claim 15 including the step, after detection of initial movement of the output shaft, of

(e) categorizing within said another load status the load on the power take-off shaft based upon the detected time of initial movement of the output shaft relative to at least one predetermined time;

and wherein the second set of time-based engagement control signals are dependent upon the load status and the load categorization made in step (e).

17. The method of claim 16 wherein a first subset of said second set of engagement control signals comprises engagement control signals dependent upon the rate of change over time of the output shaft speed signals and the input shaft speed signal at a given time, whereby the controller determines a desired acceleration for the output shaft.

18. The method of claim 14 wherein a first subset of said second set of engagement control signals comprises engagement control signals dependent upon the rate of change over time of the output shaft speed

signals and the input shaft speed signal at the time of engagement control signal generation, whereby the controller repetitively determines a desired acceleration for the output shaft over a period of time.

19. The method of claim 14 wherein the engagement control signals have characteristics which are representative of associated amounts of clutch pressure to be applied at given times.

20. The method of claim 14 wherein the engagement control signals have magnitudes which are characteristics representative of associated amounts of clutch pressure to be applied at given times.

21. The method of claim 14 wherein the engagement control signals are pulse-width modulated signals having a predetermined frequency, and the pressure applied to the clutch is substantially proportional to the pulse-width of the modulated signals.

22. The method of claim 14 wherein, at a plurality of predetermined times during said first time period, the controller generates distinct engagement control signals that are shock control signals each having a characteristic defined by a different relationship than the characteristics of non-shock control signals generated over the first period of time, the characteristic of each such shock control signal being associated with a markedly and distinguishably higher clutch pressure and out of accordance with the particular pattern of clutch pressures associated with non-shock engagement control signals generated over the first period of time.

23. A method for engaging variable loads on a power take-off shaft in a system having

a power source for producing rotational motion;

a power take-off shaft for supplying rotational motion to at least one piece of equipment coupled to the power take-off shaft;

a clutch including an input shaft coupled to the power source and an output shaft coupled to the PTO shaft, wherein the clutch transmits a maximum torque between the input and output shafts in response to a maximum clutch pressure and transmits a selectable torque between the input and output shafts in response to a given clutch engagement pressure less than the maximum clutch engagement pressure;

a first transducer disposed to generate an input shaft speed signal representative of the rotational speed of the input shaft;

a second transducer disposed to generate an output shaft speed signal representative of the rotational speed of the output shaft;

a clutch control configured to effect engagement and disengagement by the clutch in response to engagement control signals applied thereto, the clutch transmitting a selectable torque between the input and output shafts dependent upon a given clutch engagement pressure defined by said engagement control signals, wherein the clutch engagement pressure is variable up to the maximum engagement pressure;

a controller coupled to the clutch control, the first transducer, and the second transducer, said controller operable to monitor the input shaft speed signals and the output shaft speed signals generated by said first and second transducers, and to produce time-based engagement control signals dependent thereon,

the engagement control signals each including a characteristic representative of an associated amount of clutch pressure to be applied; and

the controller operable to generate a first set of time-based engagement control signals during a time period between commencement of an engagement operation and the time at which an output shaft speed signal indicative of movement by the output shaft is detected by said controller, and a second set of engagement signals at times subsequent to said detection of movement by the output shaft;

the method comprising:

(a) monitoring the input and output shaft speed signals to detect the speeds at given times of the input and output shafts;

(b) periodically checking to determine if output shaft movement has occurred;

(c) upon detection of initial output shaft movement, checking to determine whether the monitored input speed at such time has remained within an established deviation value from the nominal input speed prior to such time and,

(1) if the input speed has remained within the established deviation value, establishing a first load status and then proceeding to step (d); or

(2) if the input speed has not remained within the established deviation value, establishing another load status and then proceeding to step (d);

(d) applying a set of time-based engagement control signals, dependent in part upon the established load status, to the clutch;

whereby a set of time-based engagement control signals for the first load status define a flattened control curve relative to control curves that would be applied for loads of said another load status.

24. The method of claim 23 wherein generation of the second set of time-based engagement control signals includes the step, prior to step (d), of categorizing within the another load status the load on the power take-off shaft based upon the detected time of initial movement of the output shaft relative to at least one predetermined time, and wherein the engagement control signals applied in step (d) are dependent upon such load categorization.